Koch, Kristine

From: Koch, Kristine
Sent: Monday, August 25, 2014 9:51 AM
To: James McKenna
Cc: Jennifer Worenets (jworonets@anchorqea.com); Bob Wyatt (rjw@nwnatural.com); Carl Stivers (cstivers@anchorqea.com); Amanda Shellenberger (ashellenberger@anchorqea.com); Sheldrake, Sean
Subject: RE: bioaccumulation models for additional PCDD/F congeners of interest

Jim – Thanks for letting me know. We understand the delay; these types of events are unforeseeable. I'm so sorry for the Windward statistician and hope she didn't lose too much in the fire.

Regards,

Kristine Koch
Remedial Project Manager
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From: James McKenna [mailto:jim.mckenna@verdantllc.com]
Sent: Friday, August 22, 2014 5:46 PM
To: Koch, Kristine
Cc: Jennifer Worenets (jworonets@anchorqea.com); Bob Wyatt (rjw@nwnatural.com); Carl Stivers (cstivers@anchorqea.com); Amanda Shellenberger (ashellenberger@anchorqea.com); Sheldrake, Sean
Subject: FW: bioaccumulation models for additional PCDD/F congeners of interest

Kristine,
Please see John's email below regarding the bioaccum modeling of the PCDD/F congeners. The Windward team has made fantastic progress with the bioaccum model. However, as noted towards the end of his email the Windward statistician lost her home in a fire and was not be able to complete the model inputs in order to generate the PRGs. We should be able to complete this final step next week and get you the initial draft D/F congener PRGs at that time.

Jen is out of the office today, so I am not sure I appropriately cc'd all the EPA team members that typically get added to these emails. Please forward this to anyone on your team you deem appropriate.

Thanks,

Jim McKenna
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From: John Toll [mailto:JohnT@windwardenv.com]
Sent: Friday, August 22, 2014 5:43 PM
To: James McKenna
Cc: Bob Wyatt (rjw@nwnatural.com); Jennifer Worenets (jworonets@anchorqea.com); Patty Dost (pdost@pearllegalgroup.com)
Subject: bioaccumulation models for additional PCDD/F congeners of interest

Hi Jim,

Windward has completed the bioaccumulation model for the additional PCDD/F congeners of interest (1,2,3,4,7,8-HexaCDF; 1,2,3,6,7,8-HexaCDD; 1,2,3,7,8-PentaCDD; 2,3,7,8-TCDF and 2,3,7,8-TCDD). This was a lot of work in a very short time, but we are confident that the models are good. The following table shows the congener-specific parameters for the calibrated congener models, and the model performance statistics (SPAFs).

Summary of selected parameter values for dioxin/furan congener bioaccumulation models and calibrated model performance

DF Congener	Parameter	Unit	Nominal Value	Range / Distribution	Selected Value	Notes
1,2,3,4,7,8-HexaCDF	Sediment SWAC	µg/kg	0.00271	-	0.00271	
	Water concentration - site	ng/L	1.10E-05	-	1.10E-05	
	Water concentration - bkgd	ng/L	7.23E-06	-	-	used for PRGs only
	log K_{OW}	kg/L	7.66	6.92 - 7.92	7.0	
	Invertebrate K_M	1/day	0	none	0	
	Fish K_M	1/day	no info	no info	0.02	
1,2,3,6,7,8-HexaCDD	Sediment SWAC	µg/kg	0.0766	-	0.0766	
	Water concentration - site	ng/L	2.43E-05	-	2.43E-05	
	Water concentration - bkgd	ng/L	1.61E-05	-	-	used for PRGs only
	log K_{OW}	kg/L	7.74	7.58 - 9.13	7.74	
	Invertebrate K_M	1/day	0	none	0	
	Fish K_M	1/day	0.04	0 - 0.4	0.08	
1,2,3,7,8-PentaCDD	Sediment SWAC	µg/kg	0.00025	-	0.00025	
	Water concentration - site	ng/L	6.91E-06	-	6.91E-06	
	Water concentration - bkgd	ng/L	2.11E-06	-	-	used for PRGs only
	log K_{OW}	kg/L	7.06	6.49 - 7.56	6.7	
	Invertebrate K_M	1/day	0	none	0	
	Fish K_M	1/day	0.02	0 - 0.2	0.01	

2,3,7,8-TetraCDF	Sediment SWAC	µg/kg	0.0168	-	0.0168	
	Water concentration - site	ng/L	7.83E-06	-	7.83E-06	
	Water concentration - bkgd	ng/L	3.75E-06	-	-	used for PRGs only
	log K_{OW}	kg/L	6.3	5.82 - 7.7	7.5	
	Invertebrate K_M	1/day	0	none	0	
	Fish K_M	1/day	0.04	0.04 - 0.2	0.1	
2,3,7,8-TetraCDD	Sediment SWAC	µg/kg	0.0001	-	0.0001	
	Water concentration - site	ng/L	1.25E-05	-	1.25E-05	
	Water concentration - bkgd	ng/L	3.24E-06	-	-	used for PRGs only
	log K_{OW}	kg/L	6.38	5.38 - 8.93	6.9	
	Invertebrate K_M	1/day	0	none	0	
	Fish K_M (other spp)	1/day	0.007	0.007 - 0.024	0.007	
	Fish K_M (carp)	1/day	0.0016	0.0016 - 0.056	0.0016	

A SPAF of 1 means that the model-predicted tissue concentration exactly equals the sample average tissue concentration. A SPAF of 2 means that the model predicts the sample average with a factor of 2, etc. Within a factor of 2 is an excellent agreement (because keep in mind that the sample average tissue concentrations that we compare to are also uncertain estimates of the true mean). We calibrated to carp and smallmouth bass because these are target species for the HHRA with robust datasets. You'll see that all SPAFs for all congeners of interest are within a factor of 2. If we'd have had more time we'd have done more testing of model fit, (e.g., evaluating the consistency of calibrations across congeners in greater depth). But we're very happy with the calibrations and we believe that the models are suitable and ready to use for calculating congener-specific PRGs.

In addition to the bioaccumulation modeling there is another step that is necessary to calculate sediment PRGs for individual PCDD/F congeners. That step is developing statistical regression models between individual congener concentration in fish tissue and the TEQ concentration in fish tissue.

Once we calculate the regression models, we can convert the TEQ target tissue concentration into an individual congener target tissue concentration. The individual congener target tissue concentrations are the inputs to the bioaccumulation model, which is run backward to calculate the PRGs.

We've had a very unfortunate problem come up that has slowed down our work on the statistical regressions. Our statistician lives in the Methow Valley. A couple weeks ago she lost her house in the fires, along with virtually all of their possessions. Everyone's okay, they have temporary housing, and they've already turned their attention to rebuilding, but she's been unable to work.

Understanding EPA's request to have as much of this draft work completed by close of business today, we attempted a simpler and weaker approach to calculating the tissue TEQ to tissue congener relationships, but it hasn't worked. We are getting predictions that are not consistent with the empirical data. We can fix this problem, but we need a little more time. We think it's going to be the latter part of next week before we'll have defensible model inputs (target tissue concentrations for individual congeners). We need to get those inputs right before we can get defensible PRGs out of the bioaccumulation models. So, the bioaccumulation models are done, but we need a little more time to generate the model inputs that we need to calculate PRGs.

Let me know please if you have any questions or concerns.

John